

## Energy:

- Overall Definition: Capacity to do work or cause motion

- Units: Joule (J)

$$1 \text{ J} = 1 \text{ N} \cdot \text{m} = 1 \text{ kg} \cdot \text{m}^2 / \text{s}^2$$

- Two Overall Types of Energy:

- Kinetic → energy of motion

- Equation:  $KE = \frac{1}{2} m v^2$

Kinetic Energy      mass      velocity

- Potential → energy stored due to position or shape


- Each "type" of energy will have at least 1 way energy can be stored

# • Seven Types of Energy:

## 1. Mechanical

- Most common in everyday experience
- Examples: Running, car moving
- Potential Energy:
  - Gravitational Potential Energy

- Equation:



$GPE = m a_g h$

mass ←  
acceleration ← due to gravity  
height

$GPE = 0 J$   
 $h = 0m$   
 $h = 5m$

mass of ball = 10 kg

$$GPE = (10 \text{ kg})(9.8 \text{ m/s}^2)(5 \text{ m})$$

$$= 490 J$$

- Elastic Potential Energy

- Energy stored by things that stretch or compress

## 2. Chemical

- Energy associated with atoms, ions, and molecules (bonds between atoms).
- Think of this as potential energy, because energy is typically used to do something else.
- Examples: Food, batteries, gasoline, fireworks

## 3. Electrical (formally Electromagnetic)

- Energy of electrons in a circuit. (kinetic part)
- Electric potential energy comes from electric fields (same for magnetic).

#### 4. Nuclear

- Energy associated with the nucleus of atoms.
- Two types: fission and fusion

#### 5. Thermal

- Energy associated with heat and vibration of molecules.
- Often a byproduct of another type of energy

#### 6. Light/Radiant

- Energy associated with light waves and electromagnetic spectrum
- Doesn't need a medium to travel

#### 7. Sound

- Energy associated with sound waves
- Does require a medium to travel
- Often a byproduct of other types of energy